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Keywords

body satisfaction, emotional eating, mood, self-regulation, obesity

Acknowledgements/Disclaimers/Disclosures

The author has no conflict of interest to report, financial or otherwise.

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Abstract

Because of social pressures for thinness in women, body image/body satisfaction is often problematic. Although associations between body satisfaction, emotional eating, and changes in both have been proposed, they are not well-understood and might have implications for weight loss treatments. Women participants of a community-based obesity treatment (M_{age} = 41.4 years) with either high (n = 65) or normal (n = 79) propensities for emotional eating at baseline were measured on body satisfaction, eating-related self-regulation, dimensions of negative mood and emotional eating, exercise and eating behaviors, and weight at baseline and Months 3 and 6. The high emotional eating group had significantly higher scores on the negative mood and emotional eating measures, and significantly lower body satisfaction. However, that group demonstrated significantly greater improvements on those measures, and on the intake of fruits/vegetables and sweets, than the normal emotional eating group. Body satisfaction change was significantly predicted by exercise, weight, and eating measure changes, unaffected by group. Changes in body satisfaction significantly predicted changes in emotional eating. However, when changes in self-regulation and the mood measures were entered as sequential mediators, the overall mediation models were significant but not those relationships. Findings will inform obesity treatment targets and improve potentials for reductions in the health risks of participants.

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Obesity, defined as a body mass index (BMI) of at least 30 kg/m^2, is an enduring problem in developed countries leading to a plethora of health risks and reduced quality and length of life (Żukiewicz-Sobczak et al., 2014). In the United States, obesity in adults has progressively risen to 42% of the overall population. Severe obesity and the greatest risks to health occur most frequently in women (Hales et al., 2020). Although only approximately 5% of U.S. adults with obesity are being treated (Stokes et al., 2018), women seek treatment more frequently than men (Bish et al., 2005). Women, particularly women with obesity, were found to be especially susceptible to emotional eating or propensities for eating in response to negative mood states (Geliebter & Aversa, 2003; Penéau et al., 2013; Smith et al., 2020).

Although emotional eating could include the overconsumption of any type of food, intake of sugar-sweetened, calorie-dense foods (i.e., "sweets") might be especially pronounced (Konttinen et al., 2010; Pilska & Nesterowicz, 2016). In what was also termed "comfort eating," a review of 16 studies by Gibson (2012) concluded that emotional eating occurs particularly in women and individuals with obesity, and sweets and other energy-dense foods are used to improve mood. They also found that although effects are transient, they are sufficient to induce repeated cycles of eating in response to negative mood. Macht's (2008) model summarizes five classes of emotion-affected eating: (a) emotional control of food choice, (b) emotional restraint of food consumption, (c) diminishment of cognitive controls of eating, (d) eating to regulate mood, and (e)

adjustment of eating behaviors based on mood.

Emotional eating might be underestimated in its importance related to obesity. For example, in a study of over 1500 adults, emotional eating – while being associated with other psychological factors thought to be correlates of obesity such as depression, anxiety, restrained eating, and binge eating – was the *strongest* predictor of weight gain (Koenders & van Strien, 2011). That study's researchers concluded that to prevent obesity over the long term, behavioral treatment approaches will need to effectively address emotional eating (Koenders & van Strien, 2011). That conclusion was suggested to be especially true for women (Teixeira et al., 2010).

Body image is also a psychological construct of high relevance to women that can be a predictor of emotional eating (Pinkasavage et al., 2015). Poor body image is markedly problematic for women with obesity due to societal pressures for female thinness across age ranges (Hesse-Biber, 2007; Marshall et al., 2012). In each of the six identified studies to date assessing the association of body image and emotional eating (Duarte & Pinto-Gouveia, 2015; Elridge & Agras, 1996; Geller et al., 2020; Green & Buckroyd, 2008; Quick & Byrd-Bredbenner, 2013; Wiedmann & Saules, 2013), an inverse relationship was found. However, in addition to their samples being primarily non-obese, each incorporated cross-sectional analyses rather than assessing relationships and their directionalities between *changes* in those psychological factors. This is a limitation because time-series findings are needed to inform researchers and practitioners of the dynamic processes occurring within obesity treatments, which evolve over months. One study that addressed changes in emotional eating and body satisfaction over 12 and 24 months of behavioral treatment indicated their significant bivariate relationship with weight loss; however, their interrelationship was not assessed (Teixeira et al., 2010). This was possibly due to the high number of related psychological variables included in that study that could have co-varied and/or induced a Type I error. Even confidence in the directionality between body satisfaction and emotional eating, and weight loss, was reduced because the respective measurements of change were during the same temporal period. Although counter to suggestions (Baranowski, Cerin, et al., 2009; Baranowski, Lin, et al., 1997; Rothman, 2004), lack of a guiding theory, use of probative cross-sectional analyses, and failure to assess mediators of effects have been typical in related research.

Social cognitive theory (Bandura, 1986) posits triadic reciprocal relationships between environmental (e.g., social standards for weight), cognitive/affective (e.g., mood, body image), and behavioral (regulation of one's eating and exercise behaviors) factors. It is favorable to systematically evaluate possible relationships between variables through the lens of accepted predictive/explanatory paradigms such as social cognitive theory in advancing the development of behavioral treatments for obesity (Baranowski, Cerin, et al., 2009; Baranowski, Lin, et al., 1997; Rothman, 2004). Although it is consistent with social cognitive theory that loss of weight will induce an improved perception of one's body through increased feelings of competence (when weight loss is a goal), it is also possible that progress with more proximal goal-directed behaviors such as increases in exercise and fruit/vegetable intake, and reductions in sweets, are associated with a better body image. Improved knowledge of such potential correlates of change in body satisfaction could inform treatment developers to what extent they should emphasize participants' incremental im-

provements in exercise and eating behaviors in advance of their weight loss (which is often perceived as disappointingly slow, impeding persistence; Annesi & Johnson, 2015).

Assessing the prediction of change in propensity for emotional eating via an earlier change in body satisfaction (i.e., through lagged variable analyses; Cromwell et al., 1994) would provide a degree of confidence in directionality of that relationship. Establishing mechanisms by which such an association occurs could also be useful for improving treatment targets and designs. For example, an improved body image might be associated with better mood (e.g., depression, anxiety, anger) due to feelings of generalized well-being (Baker & Brownell, 2000; Bandura, 1986). Mood might be improved through the treatment component of regular exercise (Arent et al., 2020). Positive effects on mood associated with exercise have been especially pronounced in deconditioned individuals who were previously inactive, but in need of behavioral support to promote adherence (Annesi, 2020; Trost et al., 2002). Improvements in mood might then induce a reduction in emotionally cued eating (Spoor et al., 2007). Consistent with both social cognitive (Bandura, 1986, 2005) and self-regulation (Vohs & Baumeister, 2016) theories' attention to internal processes to facilitate regulation of behaviors, learned self-regulatory skills could also help control propensities for emotional eating (Juarascio et al., 2020). Recent research (Gendolla & Brinkman, 2015) suggests that mood improvements empower self-regulatory skills usage to extend effects on emotional eating.

Mediation and moderated mediation analyses (Hayes, 2018) offer an opportunity to test such theory-driven paths toward changes in emotional eating. A better understanding of the effects of psychosocial factors and their interrelationships has been considered essential for the improvement of obesity treatments (Baranowski, Cerin, et al., 2009), which have continued to lack both a basis in accepted behavioral theory and positive outcomes (Dombrowski et al., 2014; Loveman et al., 2011; Mann et al., 2007). Also, participants' scores and score changes on relevant psychological and behavioral variables might differ in a manner where treatments require tailored attention based on initial propensities for emotional eating.

Therefore, the present research was conducted among women with obesity – classified as having either a high or normal propensity for emotional eating at study start – within a behavioral weight-loss treatment setting. The initial 6 months after treatment outset was the study time frame because that is the period when weight loss typically occurs (Dombrowski et al., 2014; Jeffery et al., 2000; Loveman et al., 2011), and success in negotiating psychological barriers is required during that time to enable maintained improvements (Annesi, 2020). Although it was left as a research question whether the high and normal propensity for emotional eating groups would significantly differ from one another on study measures, the following hypotheses were given:

1. Changes in exercise, eating behaviors, and weight will significantly predict body satisfaction change, regardless of group.

2. Change in body satisfaction will significantly predict later changes in propensities for emotional eating.

3. Changes in mood and eating-related self-regulation will sequentially mediate relations between changes in body satisfaction and propensity for emotional eating, with change in exercise moderating the body satisfaction-mood change relationship.

Method

Participants

Participant data were from a continuing research program with aims of contrasting outcomes of behavioral weight-loss treatments that varied in their curricular content and modality of administration (which were different than the goals of the present study). Volunteers were recruited through electronic media and informed that the weight-management treatment they would be randomized into would include methods to increase exercise and healthy eating. Inclusion criteria were being female of at least 18 years, having obesity but no contraindication for safe participation, and no soon-planned/present pregnancy. They were required to have a goal of weight loss. Because of possible effects on the psychological measures (see McNair & Heuchert, 2009), change in any prescribed psychotropic medication 1 year prior to, or during, the study time frame was a reason for exclusion. For the present investigation and consistent with previous research (van Strien et al., 2012), each participant was classified as either high propensity for emotional eating (n = 65) or normal propensity for emotional eating (n = 79) based on whether her baseline overall score on the Emotional Eating Scale (Arnow et al., 1995) was ≥ 1.7 or < 1.7, respectively (1.7 representing the scale's 80th percentile based on normative values; Eldregde & Agras, 1996; Green & Buckroyd, 2008; Waller & Osman, 1998). Chi-square and one-way ANOVAs indicated no significant (ps > .15) group difference on age (overall M = 41.4 years, SD = 13.8), BMI (overall M = 35.5 kg/m^2, SD = 3.4), yearly family income (overall M = US$67,000, SD = 23,000 [largely middle income]), race/ethnicity (overall 75% white, 19% black, and 6% other), and behavioral treatment format in which she participated (see Procedure section). Institutional review board (IRB) approval and IRB-authorized written informed consent was obtained prior to the start of any study process. Ethical requirements of the American Psychological Association and the Helsinki Declaration were followed throughout.

Measures

Body satisfaction. Body satisfaction was measured by the 9-item Body Areas Satisfaction Scale of the Multidimensional Body-Self Relations Questionnaire (Cash, 2000, 2015). Response options for satisfaction with the respondent's body areas (e.g., "lower torso [buttocks, hips, thighs, legs]"; "mid torso [waist, stomach]") ranged from 1 (*very dissatisfied*) to 5 (*very satisfied*). Based on the scale developer's instructions (Cash, 2000), a mean item score was calculated (i.e., item score total/number of items), with a higher score indicating a higher level of body satisfaction. Research confirmed the adequacy of the scale's items being unweighted (Giovannelli et al., 2008). Reported internal consistencies for women (Cash, 2000), and women mostly post-bariatric surgery (de Zwaan et al., 2014), were Cronbach's α = .73 and .75, respectively. Test-retest reliability over 4 weeks was reported to be .74 (Cash, 2000). The stability of the Body Areas Satisfaction Scale was also indicated by a high degree of agreement of participant responses over 2 weeks (Nevill et al., 2015). Internal consistency for the present sample was Cronbach's α = .75.

Propensity for emotional eating. The extent feelings related to depression, anxiety, and anger/frustration led the respondent to eat as a reaction was measured by the Emotional Eating Scale (Arnow et al., 1995). Overall emotional eating (Overall EmE; 25 items) was also assessed as an aggregate of the Emotional Eating-Depression (EmE-Depression, 5 items; e.g., "sad"), Emotional

Eating-Anxiety (EmE-Anxiety, 9 items; e.g., "on edge"), and Emotional Eating-Anger/Frustration (EmE-Anger/Frustration, 11 items; e.g., "irritated") subscales. Response options to "… the extent the following feelings lead you to an urge to eat…" ranged from 0 (*no desire to eat*) to 4 (*an overwhelming urge to eat*). To facilitate equal weights across subscales (each with a different number of items), and consistent with previous research (Annesi, in press), a mean item score was calculated. A higher score indicated a greater propensity to rely on food to manage emotions. In women with obesity, internal consistencies were reported to be .72 (EmE-Depression), .78 (EmE-Anxiety), and .78 (EmE-Anger/Frustration), with test-retest reliability over 2 weeks at .79 for the total scale score (Arnow et al., 1995). Associations with accepted scales of binge eating (Ricca et al., 2009), along with lack of associations with scales of general psychopathology and self-esteem (Arnow et al., 1995), provided evidence of convergent and discriminant validity. The adequate reliability and validity of the Emotional Eating Scale was similar in individuals with disordered and non-disordered eating (Waller & Osman, 1998). Internal consistencies for the present sample averaged Cronbach's α = .77.

Negative mood. Overall negative mood was measured by the 30-item Total Mood Disturbance scale of the Profile of Mood States-Brief Form (McNair & Heuchert, 2009). Total Mood Disturbance is an aggregate measure of its 5-item Depression, Anxiety, Anger, Confusion, Fatigue, and Vigor subscales where respondents are required to recall their feelings "… during the past week, including today." Response options ranged from 0 (*not at all*) to 4 (*extremely*) to its one- to three-word items. Based on the goals of this research, the subscales of Depression (e.g., "gloomy"), Anxiety (e.g., "nervous"), and Anger (e.g., "annoyed") were also separately incorporated into the analyses. Item scores were summed, with a possible score range of -20–100 for the Total Mood Disturbance scale and 0–20 for the Depression, Anxiety, and Anger subscales. A higher score indicated a greater level of negative mood. In women, reported internal consistencies for the Depression, Anxiety, and Anger subscales were Cronbach's α = .81–.93, and test-retest reliabilities over an average of 3 weeks were .70–.74 (McNair et al., 1992; McNair & Heuchert, 2009). Concurrent validity was supported by score correspondences with highly validated, but lengthier, measures such as the Beck Depression Inventory, Manifest Anxiety Scale, and Minnesota Multiphasic Personality Inventory-2 (McNair et al., 1992). Internal consistencies for the present sample averaged Cronbach's α = .88.

Self-regulation of eating. Ten items measured respondents' present use of self-regulation methods that were defined via a taxonomy by Michie et al. (2011), and designated as the most commonly used for improving weight-loss behaviors (e.g., goal setting, relapse prevention, self-monitoring; Spring et al., 2020). Respondents were required to indicate "… how often you *currently* do each of the following" (e.g., "I set eating goals," "When I get off-track with my eating plans, I work to quickly get back to my routine," "I keep a record of my eating") ranging from 1 (*never*) to 4 (*often*). Item scores were summed, with a possible score range of 10–40. A higher score indicated a greater use of self-regulation regarding eating. In adults with obesity, internal consistency was reported to be Cronbach's α = .81, and test-retest reliability over 2 weeks was .74 (Annesi & Marti, 2011). Internal consistencies for the present sample averaged Cronbach's α = .84.

Exercise. Exercise outputs were measured by the Leisure-Time Physical Activity Questionnaire (Godin, 2011). Respondents recalled the number of physical activity/exercise bouts "for more than 15 minutes" completed in the previous 7 days ranging in intensity from "mild exercise (minimal exertion)" (e.g., easy walking, yoga; recorded as 3 metabolic equivalents [METs, a measure of exercise intensity; Jetté et al., 1990]) to "strenuous exercise (heart beats rapidly)" (e.g., running, basketball; recorded as 9 METs). The MET values corresponding to the number of bouts were then summed. For example, 3 bouts of easy walking would total 9 (i.e., 3 bouts × 3 METs). In respect to recent guidelines for health (Piercy et al., 2018), scale developers suggested that a 7-day total of ≥ 24, 14–23, and < 14 METs indicates substantial, some, and low benefits, respectively (Godin, 2011). Concurrent validity of the Leisure Time Physical Activity Questionnaire was indicated through strong correspondences of its scores with maximal oxygen uptake (VO_2max) test, accelerometer, and body fat values in adults (Amireault & Godin, 2015; Amireault et al., 2015; Jacobs et al., 1993; Miller et al., 1994; Pereira et al., 1997). Test-retest reliability over 2 weeks was reported to be .74 (Pereira et al., 1997).

Eating behaviors. Participants' typical daily intake of portions of fruits (e.g., small pear or apple [or 118 mL canned]), vegetables (e.g., 118 mL squash or lima beans), and sweets (e.g., small piece of cake [59 mL] or candy [30 mL]) was recalled from the previous 7 days. Portion sizes corresponded to data from the United States government (U.S. Department of Agriculture, 2017; U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2015). Fried vegetables and fruits were excluded, and instructions were provided to account for the consumption of mixed foods (e.g., salads) and large/small portions. The intake of fruits and vegetables was summed (i.e., fruits/vegetables). In women with obesity, test-retest reliabilities over 3 weeks ranged from .77–.83, and concurrent validity was indicated through significant correspondences with well-validated food frequency recall instruments requiring lengthier administration times (e.g., Block Food Frequency Questionnaire; Block et al., 1986; Mares-Perlman et al., 1993). Fruit/vegetable intake was defined as a correlate of the overall healthfulness of the diet and weight (Aljadani, 2013; Annesi, 2018; Rolls et al., 2004), and sweets consumption was judged unhealthy because of its high energy density/low nutrient value and association with obesity (Te Morenga et al., 2013).

Weight. A recently calibrated digital floor scale (Health-O-Meter Professional 800KL; McCook, IL, USA) was used to measure weight in kg. After a participant removed any heavy outer-clothing (e.g., jacket) and footwear, the mean of two measurements taken consecutively was recorded.

Procedure

Participants were approximately equally divided into three behavioral obesity treatment formats, each having their bases in social cognitive theory (Bandura 1986, 2005) and self-regulation theory (Vohs & Baumeister, 2016) and differing mainly in their administration methods. Instructors were existing staff members of the community health and educational sites where the treatments were administered. Each instructor held a national health education certification and was trained in only their assigned intervention format. To minimize intra-participant contamination, only one treatment format was administered per site. Consistent in each was an emphasis on supporting regular exercise 4–6 weeks in

advance of addressing nutritional changes. Although governmental recommendations of at least 150 minutes per week of moderate-intensity cardiovascular activity (Piercy et al., 2018) was mentioned to the participants, it was also denoted to them that *any* increase could be constructive. Age-adjusted heart rate ranges corresponding to mild-, moderate-, and strenuous-intensity activities were addressed. Self-regulation methods intended to address lifestyle barriers to regular exercise such as discomfort and time constraints (e.g., proximal goal setting, productive self-talk/cognitive restructuring, behavioral contracting, tracking/logging behaviors, recruiting social supports, accomplishment-based self-reward) were focused upon. While continuing support of regular exercise, general healthy nutrition advice was next additionally provided with a special emphasis on increasing participants' intake of fruits/vegetables and reducing their consumption of sweets. There were also recommendations for self-weighing at least once per week and limiting energy intake based on present weight. The same self-regulation skills used for maintaining regular exercise were adapted and incorporated for controlling eating. The rationale for attending to increases in exercise behavior in advance of eating behavior changes was explored elsewhere (Annesi, 2020), and is also supported by research on coaction (Heredia et al., 2020; Oaten & Cheng, 2006).

The three treatment formats had similar content and each lasted 6 months. One was manual based with 10–15-minute phone conversations for review and supplementation of the written material provided every 2 weeks. A second treatment format had six one-on-one exercise support meetings followed by small-group nutrition sessions every 2 weeks. The third format had brief phone supplementation of the group nutrition sessions additionally provided once per month. Efforts were made to keep the content of each of the treatment formats similarly focused on: (a) establishing regular exercise in advance of nutritional changes; (b) participants' development of self-regulatory skills first for supporting exercise, then generalizing those methods to improved eating behaviors (emphasizing an increase in fruit/vegetable consumption and reduction in the intake of sweets); (c) limiting overall energy intake; and (d) regular self-weighing. Measurements were administered to participants at baseline, Month 3, and Month 6 in a private area by study staff not otherwise involved in treatment processes.

Data Analysis

The 15% of missing cases had no systematic bias in their missingness (White et al., 2011). Therefore, the expectation maximization (EM) algorithm was used for imputation (Little & Rubin, 2014; Schafer & Graham, 2002), facilitating an intention-to-treat approach. For the primary analysis, 124 total participants were required to detect the small-moderate effect of $f^2 = 0.10$ at the statistical power of .80 (Cohen et al., 2003). Statistical significance was set at $\alpha \leq .05$ (two-tailed; and one-tailed where directionality of relationships were previously established within the mediation models; Annesi, 2020). Where bootstrap resamples were incorporated, a 95% confidence interval (CI) assessed significance (Hayes, 2018). Variance inflation factors were < 1.5, which indicated acceptable multicollinearity in the data.

To assess baseline differences by group, and evaluate if changes over 3 and 6 months significantly differed by group, one-way ANOVA and mixed-model repeated measures ANOVA were incorporated. Corresponding effect sizes were expressed as eta-squared ($\eta^2 = SS_{Effect}/SS_{Total}$) and partial eta-squared ($\eta^2_p = SS_{Effect}/[SS_{Effect} + SS_{Error}]$), where 0.01, 0.06, 0.14, and 0.01, 0.09, and

0.25 were, respectively, small, moderate, and large effects. Effect sizes for within-group *t* tests were expressed as Cohen's *d* ([$M_{\text{Time 2}}$ - M_{baseline}]/SD_{baseline}) where 0.20, 0.50, 0.80, were, respectively, small, moderate, and large effects. Based on suggestions for the present theory-based analyses (Perneger, 1998), there were no adjustments of α for multiple tests.

Multiple regression models incorporating data aggregated across groups next assessed the prediction of body satisfaction change over 3 and 6 months by simultaneous entry of changes (i.e., gain scores) in exercise, weight, and each measure of eating behavior in separate equations, which was justified for this type of theory-based research (Allison, 2009; Kim & Steiner, 2021; Smolkowski, 2019). Group was entered into Step 2 of those equations to assess its additional effect. Significance of the prediction of change in Overall EmE, and (separately) the proposed dimensions of the Emotional Eating Scale (Arnow et al. 1995), by body satisfaction change was next calculated through separate linear bivariate analyses.

Finally, serial multiple mediation models were fit where the change in Total Mood Disturbance, and (separately) the subscales of the Profile of Mood States-Brief Form corresponding to the Emotional Eating Scale dimensions, and eating-related self-regulation were sequentially entered as mediators of the body satisfaction-emotional eating change relationships (see Figures 1–4). Direct, indirect, and total effects were examined. Moderation of the body satisfaction-mood change relationships by exercise change was also subsequently assessed.

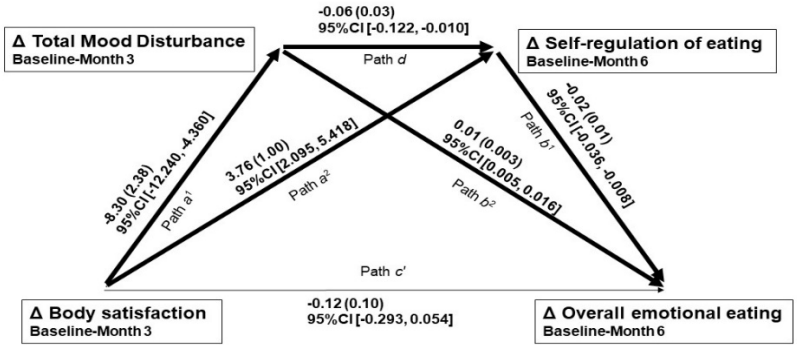

Figure 1. Serial mediation model predicting change in overall propensity for emotional eating from previous change in body satisfaction through changes in Total Mood Disturbance, then self-regulation of eating. Note: Data are based on groups aggregated (N = 144). Δ = change during designated temporal interval. Data concerning each bivariate path within the model are given as unstandardized beta (and the corresponding SE), with the 95% confidence interval (95%CI) in brackets. Heavy lines denote a statistically significant path toward change in overall propensity for emotional eating.

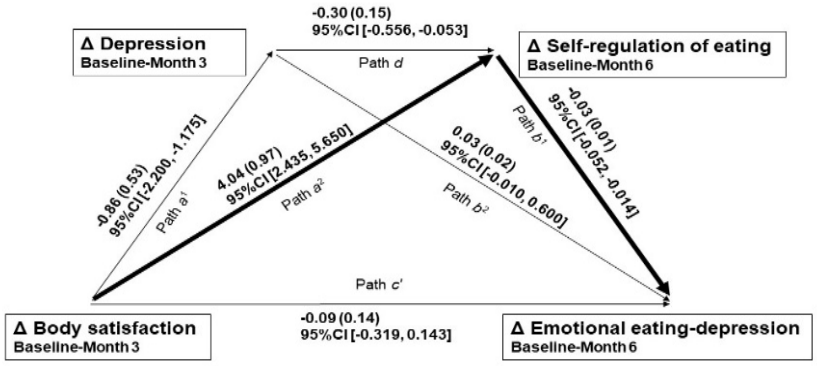

Figure 2. Serial mediation model predicting change in propensity for emotional eating related to depression from previous change in body satisfaction through changes in depression, then self-regulation of eating. Note: Data are based on groups aggregated (N = 144). Δ = change during designated temporal interval. Data concerning each bivariate path within the model are given as unstandardized beta (and the corresponding SE), with the 95% confidence interval (95%CI) in brackets. Heavy lines denote the statistically significant path toward change in overall propensity for emotional eating related to depression.

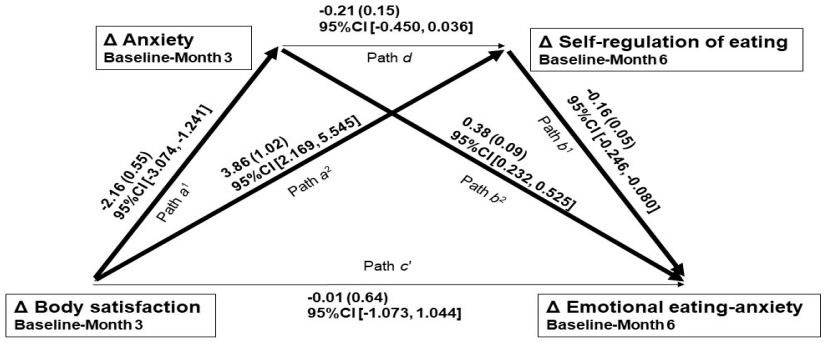

Figure 3. Serial mediation model predicting change in propensity for emotional eating related to anxiety from previous change in body satisfaction through changes in anxiety, then self-regulation of eating. Note: Data are based on groups aggregated (N = 144). Δ = change during designated temporal interval. Data concerning each bivariate path within the model are given as unstandardized beta (and the corresponding SE), with the 95% confidence interval (95%CI) in brackets. Heavy lines denote the statistically significant paths toward change in propensity for emotional eating related to anxiety.

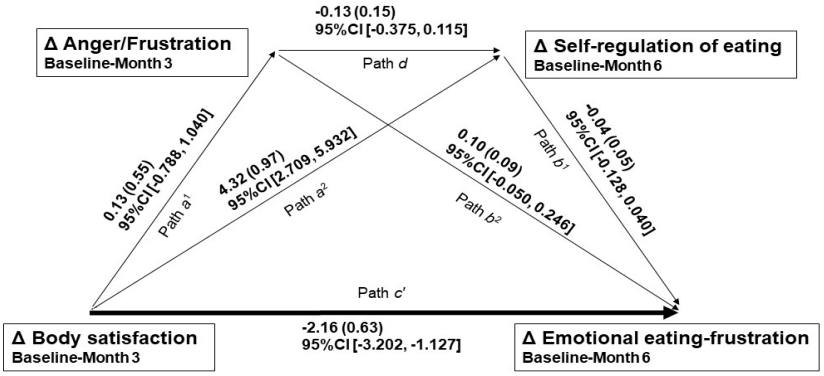

Figure 4. Serial mediation model predicting change in propensity for emotional eating related to frustration from previous change in body satisfaction through changes in anger/frustration, then self-regulation of eating. Note: Data are based on groups aggregated ($N = 144$). Δ = change during designated temporal interval. Data concerning each bivariate path within the model are given as unstandardized beta (and the corresponding SE), with the 95% confidence interval (95%CI) in brackets. The heavy line denotes the statistically significant path toward change in propensity for emotional eating related to frustration.

Within the regression models, based on previous suggestions (Glymour et al., 2005; Kim & Steiner, 2021) and no observation of floor or ceiling effects in the present data, change scores were uncontrolled for their baseline values. Also within the regression models, tenets of lagged variable analyses (Cromwell et al., 1994) were incorporated where score change over a later temporal period (e.g., 6-month change) was predicted by change over a previous period (e.g., 3-month change). The present EM algorithm for imputation was indicated as appropriate for such lagged designs (Ding & Song, 2016). SPSS Statistics Version 26 (IBM, Armonk, NY) was used throughout, incorporating the Process macro-instructional software Version 3.5 for serial multiple mediation (Model 6) and moderated mediation (Model 83) with 50,000 resamples (percentile bootstrap method; Hayes, 2018).

Results

Scores and Score-change Contrasts, by Group

Scores on each study measure at baseline and Months 3 and 6 are given in Table 1. At baseline, the high emotional eating propensity group had significantly higher scores than the normal emotional eating propensity group (all *df*s = 1, 142; all *p*s < .01) on Total Mood Disturbance, $F = 36.04$, $\eta^2 = 0.20$; Depression, $F = 10.22$, $\eta^2 = 0.07$; Anxiety, $F = 14.27$, $\eta^2 = 0.09$; Anger, $F = 7.59$, $\eta^2 = 0.05$; Overall EmE, $F = 271.43$, $\eta^2 = 0.66$; EmE-Depression, $F = 88.69$, $\eta^2 = 0.38$; EmE-Anxiety, $F = 65.70$, $\eta^2 = 0.32$; and EmE-Anger/Frustration, $F = 191.86$, $\eta^2 = 0.57$; and a significantly lower score on body satisfaction, $F = 10.75$, $\eta^2 = 0.07$.

Table 1

Baseline, Month 3, and Month 6 Scores of Study Variables, and Their Score Changes, by Group

Measure	Baseline		Month 3		Δ Baseline-Month 3			Month 6		Δ Baseline-Month 6		
Group	*M*	*SD*	*M*	*SD*	*M*	*SD*	*d*	*M*	*SD*	*M*	*SD*	*d*
Exercise (METs/week)												
High emotional eating	10.22	9.31	29.03	14.68	18.81	13.49	2.02	29.83	16.49	19.61	15.54	2.11
Normal emotional eating	10.72	8.18	28.59	16.10	17.87	15.72	2.18	29.27	16.07	18.54	15.99	2.26
Aggregated data	10.50	8.68	28.79	15.42	18.29	14.71	2.10	29.52	16.21	19.02	15.74	2.19
Sweets (portions/day)												
High emotional eating	2.37	1.59	1.31	1.11	-1.06	1.45	0.66	1.14	1.05	-1.23	1.57	0.77
Normal emotional eating	1.96	1.78	1.37	1.04	-0.59	1.64	0.33	1.37	1.28	-0.60	1.62	0.33
Aggregated data	2.15	1.70	1.34	1.07	-0.81	1.57	0.47	1.26	1.18	-0.88	1.63	0.52
Fruits/Vegs (portions/day)												
High emotional eating	3.22	1.84	5.16	2.30	1.93	2.05	1.07	5.65	2.39	2.43	2.54	1.35
Normal emotional eating	3.62	1.91	4.68	2.34	1.06	1.65	0.56	4.92	2.25	1.30	1.98	0.68
Aggregated data	3.44	1.88	4.90	2.32	1.45	1.89	0.76	5.25	2.34	1.81	2.31	0.95
Weight (kg)												
High emotional eating	94.55	11.94	92.33	11.36	-2.22	3.99	0.19	89.99	11.08	-4.56	4.81	0.38
Normal emotional eating	96.38	11.55	94.69	12.09	-1.69	2.89	0.15	92.80	11.98	-3.58	3.66	0.31
Aggregated data	95.55	11.72	93.62	11.78	-1.93	3.43	0.16	91.53	11.62	-4.02	4.23	0.34
Body satisfaction												
High emotional eating	1.04	0.35	1.33	0.48	0.29	0.45	0.83	1.48	0.59	0.44	0.54	1.26
Normal emotional eating	1.28	0.49	1.53	0.58	0.25	0.57	0.51	1.71	0.66	0.43	0.67	0.88
Aggregated data	1.17	0.45	1.44	0.55	0.27	0.52	0.59	1.61	0.64	0.43	0.61	0.97
Overall emotional eating												
High emotional eating	2.41	0.50	1.72	0.62	-0.69	0.58	1.38	1.49	0.62	-0.92	0.62	1.84
Normal emotional eating	1.20	0.39	1.08	0.60	-0.12	0.57	0.30	0.94	0.55	-0.26	0.50	0.67
Aggregated data	1.75	0.75	1.37	0.69	-0.37	0.64	0.50	1.19	0.64	-0.56	0.65	0.75
Emotional eating-depression												
High emotional eating	2.91	.079	2.18	0.80	-0.72	0.91	0.90	1.90	0.90	-1.01	0.89	1.26
Normal emotional eating	1.73	0.72	1.49	0.87	-0.24	0.75	0.33	1.29	0.70	-0.44	0.71	0.61
Aggregated data	2.26	0.95	1.80	0.91	-0.46	0.86	0.48	1.56	0.85	-0.70	0.84	0.73
Emotional eating-anxiety												
High emotional eating	2.10	0.83	1.38	0.85	-0.72	0.80	0.90	1.21	0.85	-0.89	0.76	1.11
Normal emotional eating	1.13	0.61	0.93	0.72	-0.20	0.81	0.32	0.82	0.74	-0.31	0.75	0.64
Aggregated data	1.57	0.86	1.14	0.81	-0.43	0.84	0.66	1.00	0.81	-0.57	0.80	0.66
Emotional eating-anger/frustration												
High emotional eating	2.22	0.75	1.56	0.87	-0.67	0.71	0.89	1.35	0.79	-0.87	0.72	1.16
Normal emotional eating	0.81	0.46	0.82	0.73	0.01	0.73	-0.02	0.70	0.66	-0.10	0.61	0.23
Aggregated data	1.45	0.93	1.15	0.87	-0.29	0.80	0.32	1.00	0.78	-0.45	0.76	0.48
Total mood disturbance												
High emotional eating	31.79	13.05	12.58	13.13	-19.21	15.58	1.47	10.09	13.60	-21.70	17.90	1.66
Normal emotional eating	18.89	12.66	10.13	12.89	-8.75	13.46	0.75	9.34	12.76	-9.55	13.17	0.75
Aggregated data	24.71	14.32	11.24	13.01	-13.47	15.32	1.05	9.68	13.10	-15.03	16.58	1.05
Depression												
High emotional eating	5.51	3.41	2.88	2.90	-2.63	2.90	0.77	2.65	2.67	-2.86	3.34	0.84
Normal emotional eating	3.71	3.32	2.38	2.51	-1.33	3.54	0.40	2.46	2.44	-1.25	2.98	0.38
Aggregated data	4.52	3.47	2.60	2.69	-1.92	3.32	0.55	2.54	2.54	-1.98	3.24	0.57
Anxiety												
High emotional eating	6.52	4.08	3.83	3.09	-2.68	4.10	0.65	3.28	3.37	-3.24	4.78	0.79
Normal emotional eating	4.19	3.31	2.95	2.53	-1.24	3.00	0.38	2.61	2.98	-1.58	3.33	0.48
Aggregated data	5.24	3.84	3.35	2.82	-1.89	3.60	0.50	2.91	3.16	-2.33	4.12	0.61
Anger												
High emotional eating	5.58	3.23	3.42	2.70	-2.17	3.17	0.68	3.31	3.20	-2.28	3.44	0.71
Normal emotional eating	4.16	2.95	3.30	2.98	-0.86	3.50	0.29	3.08	2.49	-1.09	3.13	0.37
Aggregated data	4.81	3.15	3.35	2.85	-1.45	3.41	0.46	3.18	2.83	-1.62	3.32	0.52
Self-regulation of eating												
High emotional eating	22.62	5.66	29.97	5.29	7.35	6.88	1.29	30.43	5.63	7.82	6.94	1.37
Normal emotional eating	22.54	5.79	28.62	5.82	6.08	6.04	1.05	29.35	5.89	6.81	5.94	1.17
Aggregated data	22.58	5.71	29.23	5.61	6.65	6.44	1.17	29.84	5.78	7.26	6.41	1.27

Note. High emotional eating propensity group $n = 65$. Normal emotional eating propensity group $n = 79$. Groups aggregated $N = 144$. Δ= change during the designated period. d = Cohen's effect size for within-group change ($[M_{\text{Time 2}} - M_{\text{baseline}}]/SD_{\text{baseline}}$). A negative d value indicates unfavorable direction.

There were significant overall, and within-group, improvements on all study measures (all *p*s < .001). The high emotional eating propensity group demonstrated a significantly greater increase in fruit/vegetable intake, $F(1, 142) = 8.94$, $p = .003$, $\eta^2_p = 0.06$; and significantly greater reductions (all *df*s = 1, 142) in sweets consumption, $F = 5.62$, $p = .019$, $\eta^2_p = 0.04$; Overall EmE, $F = 50.07$, $p < .001$, $\eta^2_p = 0.26$; EmE-Depression, $F = 18.11$, $p < .001$, $\eta^2_p = 0.11$; EmE-Anxiety, $F = 21.44$, $p < .001$, $\eta^2_p = 0.13$; EmE-Anger/Frustration, $F = 47.54$, $p < .001$, $\eta^2_p = 0.25$; Total Mood Disturbance, $F = 21.97$, $p < .001$, $\eta^2_p = 0.13$; Depression, $F = 9.30$, $p = .003$, $\eta^2_p = 0.06$; Anxiety, $F = 6.02$, $p = .015$, $\eta^2_p = 0.04$; and Anger, $F = 4.70$, $p = .032$, $\eta^2_p = 0.03$, than the normal emotional eating group. Post hoc *t*-tests indicated that reduction in sweets was significantly greater in the high emotional eating propensity group from baseline–Month 3 than in the normal emotional eating group, where improvements in the normal emotional eating group during both baseline–Month 3 and baseline–Month 6 were significantly greatest on all other measures. In the high emotional eating propensity group, 57% of participants (37/65) fell to a normal-range Overall EmE score by Month 6.

Correlates of Body Satisfaction Change

Changes over 3 months in weight, exercise, and sweets consumption significantly predicted both 3- and 6-month change in body satisfaction, with changes in weight and exercise being significant independent contributors to the explained variances (Table 2, Model A_1 and B_1). When change in fruit/vegetable intake replaced sweets in the above models, the R^2 values were also significant, and again only weight and exercise changes were significant independent contributors (Table 2, Models C_1 and D_1). The entry of group into each of the above models did not significantly add to their overall explained variances (Table 2, Models A_2–D_2).

Relations Between Changes in Body Satisfaction and Propensity for Emotional Eating

At baseline, body satisfaction was significantly negatively associated with Overall EmE, EmE-Depression, EmE-Anxiety, and EmE-Anger/Frustration (βs = -.26, -.25, -.21, and -.20, respectively, *p*s < .01). Change in body satisfaction from baseline–Month 3 significantly predicted 6-month changes in Overall EmE, B = -0.30, $SE_B = 0.10$, β = -.24, $p = .002$, 95% CI [-0.468, -0.132]; EmE-Depression, B = -0.25, $SE_B = 0.14$, β = -.16, $p = .032$, 95% CI [-0.475, -0.029]; EmE-Anxiety, B = -0.31, $SE_B = 0.13$, β = -.20, $p = .009$, 95% CI [-0.518, -0.095]; and EmE-Anger/Frustration, B = -0.47, $SE_B = 0.12$, β = -.32, $p < .001$, 95% CI [-0.662, -0.274].

Mediation of the Body Satisfaction-Emotional Eating Change Relationship

When changes in Total Mood Disturbance and eating-related self-regulation were sequentially entered as mediators of the body satisfaction-Overall EmE change relationship, the total model predicting change in Overall EmE was significant, $R^2 = .17$, $F(3, 140) = 9.56$, $p < .001$. The three significant paths are shown in Figure 1. When Depression and EmE-Depression change were instead entered into the above model as the mood and emotional eating measures, the overall model predicting EmE-Depression change was significant, $R^2 = .10$, $F(3, 140) = 5.01$, $p = .003$. The one significant path through self-regulation change is shown in Figure 2. When Anxiety

Table 2

Results of Multiple Regression Analyses (Simultaneous Entry) for the Prediction of Changes in Body Satisfaction (N = 144)

Measure	R^2	ΔR^2	B	SE_B	β	*p*	95% CI
Model A_1 (Predicting change over 3 mo)	.17					< .001	
Δ Exercise			0.01	0.003	.25	.001	[0.004, 0.014]
Δ Sweets			0.05	0.03	.14	.092	[-0.008, 0.101]
Δ Weight			-0.05	0.01	-.33	< .001	[-0.074, -0.026]
Model A_2 (Predicting change over 3 mo)	.17	.001				< .001	
Δ Exercise			0.01	0.003	.25	.001	[0.003, 0.014]
Δ Sweets			0.05	0.03	.14	.087	[-0.007, 0.103]
Δ Weight			-0.05	0.01	-.33	< .001	[-0.074, -0.025]
Group			0.03	0.08	.03	.716	[-0.131, 0.190]
Model B_1 (Predicting change over 6 mo)	.18					< .001	
Δ Exercise			0.01	0.003	.26	.001	[0.004, 0.017]
Δ Sweets			0.04	0.03	.10	.207	[-0.023, 0.104]
Δ Weight			-0.06	0.01	-.34	< .001	[-0.089, -0.032]
Model B_2 (Predicting change over 6 mo)	.18	.00				< .001	
Δ Exercise			0.01	0.003	.26	.001	[0.004, 0.017]
Δ Sweets			0.04	0.03	.10	.218	[-0.024, 0.105]
Δ Weight			-0.06	0.01	-.34	< .001	[-0.089, -0.032]
Group			-0.01	0.10	-.01	.906	[-0.199, 0.177]
Model C_1 (Predicting change over 3 mo)	.15					< .001	
Δ Exercise			0.01	0.003	.23	.005	[0.003, 0.014]
Δ Fruits/Vegetables			0.003	0.02	.01	.908	[-0.042, 0.047]
Δ Weight			-0.04	0.01	-.29	< .001	[-0.067, -0.020]
Model C_2 (Predicting change over 3 mo)	.15	.00				< .001	
Δ Exercise			0.01	0.003	.23	.005	[0.003, 0.014]
Δ Fruits/Vegetables			0.002	0.02	.01	.936	[-0.044, 0.048]
Δ Weight			-0.04	0.01	-.29	< .001	[-0.067, -0.020]
Group			0.01	0.08	.01	.894	[-0.154, 0.176]
Model D_1 (Predicting change over 6 mo)	.17					< .001	
Δ Exercise			0.01	0.003	.24	.003	[0.003, 0.017]
Δ Fruits/Vegetables			0.004	0.03	.01	.889	[-0.048, 0.056]
Δ Weight			-0.06	0.01	-.31	< .001	[-0.082, -0.027]
Model D_2 (Predicting change over 6 mo)	.17	.001				< .001	
Δ Exercise			0.01	0.003	.24	.003	[0.003, 0.017]
Δ Fruits/Vegetables			0.01	0.03	.02	.836	[-0.048, 0.059]
Δ Weight			-0.06	0.01	-.31	< .001	[-0.082, -0.027]
Group			-0.03	0.10	-.03	.757	[-0.223, 0.163]

Note. The Delta symbol associated with the predictors indicates their score change from baseline–Month 3. 95% CI = 95% confidence interval. In Step 2 of each equation (denoted by subscript 2), group (coded 1 for high propensity for emotional eating, 0 for low propensity for emotional eating) was entered. In each model, the corresponding ΔR^2 was not significant.

and EmE-Anxiety change were instead entered, the overall model predicting change in EmE-Anxiety was significant, $R^2 = .22$, $F(3, 140) = 13.17$, $p < .001$. There were two significant paths, one through change in Anxiety and one through self-regulation change (Figure 3). In each of the three above models, the direct effect of change in body satisfaction on the respective emotional eating measure was rendered non-significant after entry of the mediators. This has sometimes been referred to as complete

mediation. When Anger and EmE-Anger/Frustration change were instead entered, the overall model predicting change in EmE-Anger/Frustration was significant, R^2 = .11, $F(3, 140) = 6.00$, $p = .001$ (Figure 4). The only significant path was the prediction of EmE-Anger/Frustration change by change in body satisfaction (direct effect; Path *c′*).

When added to the models depicted in Figures 1–4 as a moderator of their Path a[1], change in exercise significantly predicted change in each mood measure ($p < .001$, $p = .013$, $p = .001$, and $p = .016$, respectively); however, non-significant body satisfaction × mood change interactions indicated that moderation was not present there.

Post Hoc Analyses

Post hoc sensitivity analyses indicated that treatment format had no significant effect on any assessed relationship within the investigation. Another post hoc inquiry indicated significant associations between 6-month weight loss and reductions in Overall EmE, β = .27, $p = .001$; EmE-Depression, β = .27, $p = .001$; EmE-Anxiety, β = .18, $p = .032$; and EmE-Anger/Frustration, β = .27, $p = .005$ over the initial 3 months after treatment start.

Discussion

The purpose of this study was to further the extant understanding of dynamic changes in psychosocial variables occurring during the behavioral treatment of obesity so they may be leveraged for improved outcomes. Study groupings included women with obesity with either high or normal propensities for emotional eating at baseline. Hypotheses focused on behavioral predictors of body satisfaction, proposed associations of changes in body satisfaction and propensities for emotional eating, mediation of mood and self-regulation in the body satisfaction-emotional eating relationship, and the effects of exercise on the relationship between changes in body satisfaction and mood. Analyses indicated that the high propensity for emotional eating group had significantly less favorable scores on each assessed psychological variable at baseline than the normal emotional eating group; and their improvements over 3 and 6 months of behavioral treatment were significantly greater on both the psychological and eating-behavior variables. Although floor/ceiling effects are sometimes attributable to greater improvements when baseline scores are poorer (Glymour et al., 2005), analyses demonstrated this was not the case here. Possibly, positive treatment-associated changes were better perceived by the high emotional eating group participants which, following from that, induced more motivation and effort, especially in areas such as self-regulatory skills development/ application. However, additional research will be required to adequately assess that possibility.

Effects on exercise behavior were similarly large in both groups, with mean scores reaching and sustaining levels indicative of substantial health effects (Godin, 2011; Piercy et al., 2018). Although higher emotional eating has been associated with obesity, low mood, and a poor body image in previous cross-sectional research (Duarte & Pinto-Gouveia, 2015; Elridge & Agras, 1996; Geller et al., 2020; Green & Buckroyd, 2008; Quick & Byrd-Bredbenner, 2013; Wiedmann & Saules, 2013), an advantage of this investigation was its assessments throughout an initial 6 months (i.e., weight loss phase; Dombrowski et al., 2014; Jeffery et al., 2000; Loveman et al., 2011) of the dynamic process associated with treatment. An intervention implication is that targeted attention is required for participants entering with both elevated and normal emotional eating levels because progress on

relevant psychological variables appears to be even more challenging when initial propensities for emotion-driven eating are in a normal range (based on normative data). Also, because treatments that have potentials for large-scale dissemination should be standardized as much as possible to promote their economic and administrative efficiency (Green et al., 2013), it is advantageous that findings suggest no special benefit for curricular adjustments based on participants' propensity for emotional eating. Optimizing the selection and application of the most salient self-regulatory skills, tracking and feeding back proximal behavioral improvements, and providing productive long-term follow-up methods that are acceptable to participants (who are often seeking short-term solutions and rapid results) will be important future research goals to extend the present findings. However, generalization of findings to men, and across racial/ethnic groups and ages, remains unclear and requires replications of this research.

While improvements in exercise, eating behaviors, and weight significantly predicted body satisfaction change regardless of group, which supported Hypothesis 1, only changes in exercise and weight independently contributed to the explained variance. Possibly participants perceived a more fit body to be a result of the effort placed into exercise; but viewed weight change as the relevant marker (for body satisfaction) of any improvement in their diet. Notably, this was the case for changes in both fruit/vegetable intake (an indicator of the overall diet; Aljadani, 2013) and sweets (an unhealthy food choice; Te Morenga et al., 2013). Because dietary changes often occur in advance of weight changes, future behavioral treatments concerned with improving body satisfaction should emphasize proximal improvements in eating through careful tracking to increase attention there, rather than the more gradual changes in weight. Because regular self-weighing is a common practice in behavioral weight-loss treatments (Zheng et al., 2015), its possibility for detracting from body satisfaction in women (Klos et al., 2012) requires further investigation to determine its overall efficacy in practice. Also, because the present models concerned with the above relationships accounted for only 15–18% of the explained variance in body satisfaction change, additional theory-based explanatory variables should be sought in extensions of this research.

The significant prediction of changes in propensities for overall emotional eating – and emotional eating related to depression, anxiety, and frustration – through earlier changes in body satisfaction supported Hypothesis 2. Although the overall serial mediation models representing changes in body satisfaction→mood→self-regulation→ emotional eating were significant and supported Hypothesis 3, that complete path was significant only when the aggregate measures of Total Mood Disturbance and Overall EmE were included in a corresponding model (Figure 1). In that case, the R^2 value was .17, which also indicated that additional variables should be considered to both strengthen the predictive model and more comprehensively inform future treatments. With the exception of the model incorporating dimensions of anger/ frustration, where only the direct effect of changes in body satisfaction on emotional eating related to frustration was significant (Figure 4, Path c'), only paths from changes in body satisfaction→self-regulation→the dimension of emotional eating (Figures 2 and 3), and body satisfaction→anxiety→ emotional eating related to anxiety (Figure 3), were significant. In those models, the direct effect between changes in body satisfaction and emotional eating (Paths c') was rendered non-significant, indicating the

salient nature of mood and self-regulation as markers for improving emotional eating. The weak associations between measures of mood and self-regulation (Paths *d*) require further investigation. Possibly improvements in dimensions of mood that were untested in this study (e.g., fatigue, vigor, confusion; McNair & Heuchert, 2009) are key to the improvement of self-regulation. This line of investigation will be important because the theorized impact of mood on self-regulatory capacities (Gendolla & Brinkman, 2005) point to a possible additional treatment target when such relationships are better resolved. Although change in exercise did not significantly moderate the body satisfaction-mood change relationship, its significant direct effect on mood indicated its importance in the behavioral treatment of obesity that warrants substantial attention placed on its adherence (Annesi, 2020). Even though dropout is high in deconditioned adults (Trost et al., 2002), it has been proposed that the greatest impact of regular exercise within behavioral weight-loss interventions is in its potential for advantageous psychological changes rather than directly through energy expenditures (Annesi, 2020).

Strengths of this research included a field environment that, while being challenged on internal validity, had considerable benefits for external validity and generalizing findings to common community-based settings (Green et al., 2013). Further, it was sensitive to discrete dimensions of negative mood and propensities for emotional eating such as those related to depression, anxiety, and anger/frustration. This provided data for increasingly informed intervention foci in the future. Also, the present research evaluated effects within the context of treatments possessing traditional targets such as exercise and eating-behavior changes. Interventions specifically focused upon emotional eating and body image are typically time-consuming and expensive (Armitage, 2015; Farrell et al., 2006), and susceptible to expectation and social support effects which can confound findings (Rosenthal & Rosnow, 2009).

In addition to the specific sample of women with obesity who were willing to volunteer for a behavioral weight-loss treatment, and challenges in controlling variables within its real-world settings that were already mentioned (e.g., via intra-participant communication and social supports), other limitations of this research should be acknowledged. For example, especially because treatment formats marginally differed across participants, identification of what intervention components, administered in what manner, were most important in the induction of improvements will be important. Incorporation of comparison conditions will be useful for this and other assessments of longitudinal changes. Although the psychological constructs selected as mediators were based on tenets of social cognitive theory (Bandura, 1986, 2005) and self-regulation theory (Vohs & Baumeister, 2016), those derived from other accepted behavioral theories might be even more relevant in explaining the body satisfaction-emotional eating change relationship. Although the study timeframe was previously justified, lengthier related investigations are warranted. Just as exercise and eating-behavior improvements have been transient (Annesi, 2020; MacLean et al., 2015), so might be improvements in emotional eating and other relevant psychological factors (Viera et al., 2013). Thus, efficient and effective follow-up processes should be developed and tested based upon theory, and through longer-term research designs.

Extensions of this study should also assess how eating disorders apply to relationships identified within this research.

Implications for Health Behavior Theory

It is recommended that there be continued research on correlates of body satisfaction, and the relationship between body satisfaction and emotional eating, completed in a longitudinal manner in field settings. This will both maximize the generalization of findings and enable intervention adjustments to affect outcomes in a large-scale manner (Green et al., 2013). Although behavioral obesity treatments will continue to maintain goals of increased exercise and controlled eating, better theory-based understandings of psychological correlates of those essential behaviors are greatly needed to change the present atheoretical dependence on simply providing education, and blaming participants when their improvements are limited and transient (Annesi, 2020; Mann et al., 2007). For example, consistent with social cognitive and self-regulation theories' integration of psychological states, negotiation of barriers through self-regulation, self-perceptions, and goal-driven behavioral changes (Bandura, 1986, 1997, 2005; Vohs & Baumeister, 2006), the current findings suggest that enhanced treatment foci on factors such as body satisfaction, emotional eating, mood, and one's ability to utilize self-regulation to overcome the plethora of barriers to sustained behavior change might substantially contribute to reversal of the persistent trend of increasing obesity.

Discussion Question

Do body image and emotional eating constructs require consideration in the development of improved community-based weight-loss interventions?

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